THERMAL ARC®

THERMAL ARC 170 GMS
THERMAL ARC 220 GMS

USER'S MANUAL

The machine you have just acquired has taken advantages, in its production, of Thermal Arcs' wide experience in the manufacturing of welding machines, along with the latest technology strides in power electronics.

It will give you entire satisfaction for years if you respect all the operating and maintenance instructions given in this manual.

We strongly suggest you read very carefully chapters concerning safety and individual protection before using this machine.

We thank you in advance for your co-operation.

THERMADYNE INDUSTRIES reserve the right to make changes without previous notification. Illustrations, descriptions and characteristics are not contractually binding and do not engage the responsability of the manufacturer.

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In accordance with the warranty periods stated below, Thermadyne guarantees the proposed product to be free from defects in material or workmanship when operated in accordance with the written instructions as defined in this operating manual.

Thermadyne welding products are manufactured for use by commercial and industrial users and trained personnel with experience in the use and maintenance of electrical welding and cutting equipment.

Thermadyne will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the warranty period. The warranty period begins on the date of sale to the end user.

Thermal Arc 170 - 220 GMS	
Component	Warranty Period
Power Source	2 Years
Optional Remote Controls	6 Months

If warranty is being sought, Please contact your Thermadyne product supplier for the warranty repair procedure.

Thermadyne warranty will not apply to:

- Equipment that has been modified by any other party other than Thermadyne's own service personnel or with prior written consent obtained from Thermadyne Service Department.
- Equipment that has been used beyond the specifications established in the operating manual.
- Installation not in accordance with the installation/operating manual.
- Any product that has been subjected to abuse, misuse, negligence or accident.
- Failure to clean and maintain (including lack of lubrication, maintenance and protection), the machine as set forth in the operating, installation or service manual.

Within this operating manual are details regarding the maintenance necessary to ensure trouble free operation.

This manual also offers basic troubleshooting, operational and technical details including application usage.

You may also wish to visit our web site www.thermadyne.com select your product class and then select literature. Here you will find documentation including:

- Operator manuals
- Service manuals
- Product guides

Alternatively please contact your Thermadyne distributor and speak with a technical representative.

NOTE

Warranty repairs must be performed by either a Thermadyne Service Centre, a Thermadyne distributor or an Authorised Service Agent approved by the Company.

The equipment you have just acquired will give you entire satisfaction if you respect the operating and maintenance instructions.

Its design, the specification of the components and its manufacture are in accordance with the existing rules, French standards (NF), ISO and CEI international injunctions, EEC general lines and CEN/CENELEC standards.

In this chapter, you will find safety rules in the use of electric arc welding power sources with coated electrodes. We give you hereunder a list of recommendations and obligations you have to respect.

Safety rules must be observed, and particularly those relating to Decree 88.1056 dated November 14., 1988 concerning protective measures against electrical currents.

1. ELECTROMAGNETIC COMPATIBILITY

1.1. DECLARATION OF CONFORMITY

THERMADYNE Industries hereby declare that the machine object of this manual complies with the following European regulations:

Electromagnetic compatibility:
Rule 89/336-EEC of 3/05/89 modified by rules 92/31-EEC of 28/04/1992 and 93/68-EEC of 22/07/1993.

Low voltage:
Rule 73/23-EEC of 19/02/1973 modified by rule 93/68-EEC of 22/07/1993.

and with the national legislation transposing them.

THERMADYNE Industries also declare that following harmonised standards have been applied :

EN 50199 (1995): Electromagnetic compatibility (CEM) – Product norm for arc welding material.
EN 50060 (1990): Current source for arc manual welding with limited service.
EN 60974-1: Security rules for electric welding material. Part 1: welding current sources.
EN 50192 (1995): Arc welding material – plasma cutting systems.

1.2. INSTALLATION AND USE

The machine object of this manual complies with the European regulations about electromagnetic compatibility 89/336 CEE. It also complies with EN 50199 standard: Electromagnetic compatibility, product standard for welding machines.

The user is responsible for installing and using the arc welding equipment according to the manufacturer's instructions.

If electromagnetic disturbances are detected, then it shall be the responsibility of the user of the arc welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the welding circuit, see Note. In other cases it could involve

constructing an electromagnetic screen enclosing the welding power source and the work complete with associated input filters. In all cases electromagnetic disturbances shall be reduced to the point, where they are no longer troublesome.

NOTE - The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorised by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding current return paths, which may damage the earth circuits of other equipment.
Further guidance is given in IEC 62081 "Arc welding equipment - Installation and use" (under consideration).

1.2.1. ASSESSMENT OF AREA

Before installing arc welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account :

a) Other supply cables, control cables, signalling and telephone cables, above, below and adjacent to the arc welding equipment;
b) Radio and television transmitters and receivers;
c) Computer and other control equipment;
d) Safety critical equipment, e.g. guarding of industrial equipment,
e) The health of the people around, e.g. the use of pacemakers and hearing aids;
f) Equipment used for calibration or measurement;
g) The immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
h) The time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

1.2.2. METHODS OF REDUCING EMISSIONS

1.2.2.1. Public supply system

Arc welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the public supply system. Consideration should be given to shielding the supply cable of permanently installed arc welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

1.2.2.2. Maintenance of the arc welding equipment

The arc welding equipment should be routinely maintained according to the manufacturers recommendations. All access and service doors and covers should be closed and properly fastened when the arc welding equipment is in operation. The arc welding equipment should not be modified in any way, except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilising devices should be adjusted and maintained according to the manufacturer's recommendations.

1.2.2.3. Welding cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

1.2.2.4. Equipotential bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered.

However, metallic components bonded to the work piece will increase the risk that the operator could receive an electric shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

1.2.2.5. Earthing of the workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

1.2.2.6. Screening and shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

2. ELECTRIC SAFETY

2.1. CONNECTION OF THE WELDING POWER SOURCE TO THE NETWORK

Before connecting your equipment, you must check that:

-The meter, the safety device against over-currents, and the electric installation are compatible with the maximum power and the supply voltage of the welding power source (refer to the instructions plates).
-The connection, either single-phase, or three-phase with earth can be effected on a socket compatible with the welding power source cable plug.
If the cable is connected to a fixed post, the earth, if provided, will never be cut by the safety device against electric shocks.
-The ON/OFF switch (if exists) situated on the welding power source, is turned off.

2.2. WORKING AREA

The use of arc welding implies a strict respect of safety conditions with regard to electric currents (Decree dated 14.12.1988).

It is necessary to check that no metal piece accessible to the operators and to their assistants can come into direct contact with a phase conductor and the neutral of the network. In case of uncertainty, this metal part will be connected to the earth with a conductor of at least equivalent section to the largest phase conductor.

Make sure that all metal pieces that the operator could touch with a non insulated part of his body (head, hands without gloves on, naked arms ...) is properly grounded with a conductor of at least equivalent section to the biggest supply cable of the ground clamp or welding torch. If more than one metal ground are concerned, they need to be all interlinked in one, which must be grounded in the same conditions.

Unless very special care has been taken, do not proceed with any arc welding or cutting in

conductive enclosures, whether it is a confined space or the welding machine has to be left outside. Be even more prudent when welding in humid or non ventilated areas, and if the power source is placed inside (Decree dated 14.12.1988, Art. 4).

2.3. INTERVENING

-Before carrying out any internal checking or repair work, check that the power source has been separated from the electrical installation by locking and guard devices.
-The current plug has to be taken out. Provisions have to be taken to prevent an accidental connection of the plug to a socket.
-Cut-off through a fixed connecting device has to be omnipolar (phases and neutral). It is in the "OFF" position and cannot be accidentally put into operation.
-Maintenance works of electrical equipment must be entrusted to qualified people (Section VI, Art. 46).

2.4. MAINTENANCE

Check the good state, insulation and connection of all the equipment and electrical accessories: plugs and flexible supply cables, cables (NF A 32-510), conduits, connectors, extension cables (NF A 85-610 and CENELEC HD 433), sockets on the power source, ground and electrode-holder clamps (NF A 85-600).
These connections and mobile accessories are marked according to standards, if consistent with the safety rules. They can either be controlled by you or by accredited firms.

- Maintenance and repair works of conduits and liners have to be properly carried out (Section VI, Art. 47).
-Repair or replace all defective accessories
-Check periodically that the electrical connections are tightened and do not heat.

2.5. RISKS OF FIRE AND EXPLOSION

Welding can occur risks of fire or explosion. You have to pay attention to fire safety regulation

- Remove flammable or explosive materials from welding area.
- Always have sufficient fire fighting equipment
- Fire can break out from sparks even several hours after the welding work has been finished.

3. INDIVIDUAL PROTECTION

3.1. RISK OF EXTERNAL INJURIES

3.1.1. THE WHOLE BODY

Arc rays produce very bright ultra violet and infra red light. They will damage yours eyes and burn your skin if you are not properly protected
-The welder is dressed and protected according to the constraints his works impose him.
-Insulate yourself from the workpiece and the ground. Make sure that no metal piece, especially those connected to the network, can come into contact with the operator.
-The welder must always wear an individual insulating protection (decree of 14/12/1988, article 3-3).

Protective clothing : gloves, aprons, safety shoes offer the additional advantage to protect the operator against burns caused by hot pieces and spatter.
This protective equipment should be kept in good order and checked on a regular basis.

3.1.2. FACE AND EYES

-.It is absolutely necessary to protect your eyes against arc rays.
- Protect your hair and your face against sparks

The welding shield, with or without headset, is always equipped with a proper filter according to the arc welding current (NS S 77-104 / A 88-221 / A 88.222 standards).
In order to protect shaded filter from impacts and sparks, you have to add a plain glass in front of the shield.
The helmet provided with your equipment (if requested) is equipped with a protective filter. When you want to replace it, precise the reference and number of opacity degree of the filter. Use the shade of lens as recommended in the instruction manual (opacity graduation number)

Protect others in the work area from arc rays by using protective booths, UV protective goggles, and if necessary, a welding shield with appropriate protective filter on (NF S 77-104 - by A 1.5).

Opacity gradation numbers and recommended use for arc welding

Welding process or connected techniques	Current intensity in Amps 0.5 1 2.5 5 10 15 20 30 40 60 80 100 125 150 175 200 225 250 275 300 350 400 450 500
Coated electrodes	9 10 11 12 13 14
MIG on heavy metals	10 11 12 13 14
MIG on light alloys	10 11 12 13 14 15
TIG on all metals	9 10 11 12 13 14
MAG	10 11 12 13 14 15
Air/Arc gouging	10 11 12 13 14 15
Plasma cutting	9 10 11 12 13

Depending on the conditions of use, the next highest or lowest category number may be used.
The expression “heavy metals” covers steels, alloyed steels, copper and its alloys.
The shaded areas represent applications where the welding processes are not normally used at present.

CARE : Use a higher degree of filters if welding is performed in premises which are not well lighted.

3.2. RISK OF INTERNAL INJURIES

GASES AND FUMES

Gases fumes produced during the welding process can be dangerous and hazardous to your health. Arc welding works have to be carried out in suitable ventilated areas.

Ventilation must be adequate to remove gases and fumes during operation. All fumes produced during welding have to be removed as soon as they are given off, and as close as possible from the place they are produced to be the most efficient.

Vapors of chlorinated solvents can form the toxic gas phosgene when exposed to ultraviolet radiation from an electric arc.

3.3. SAFETY IN THE USE OF GASES (WELDING WITH TIG OR MIG INERT GASES)

3.3.1. COMPRESSED GAS CYLINDERS

Compressed gas cylinders are potentially dangerous. Refer to suppliers for proper handling procedures.
- No impact: secure the cylinders and keep them away from impacts.
- No excess heat (over 50°C)

3.3.2. PRESSURE RELIEF VALVE

Check that the pressure relief screw is slackened off before connecting to the cylinder.
Check that the union is tight before opening the valve of the cylinder. Open it slowly a fraction of a turn.
If there is a leak, NEVER tighten a union which is under pressure, but first close the valve on the cylinder.
Always check that hoses are in good condition.

3.3.3. DETAILS ABOUT GASES

Gas and gaseous mixtures containing less than 20% of CO_2:
If these gases or mixtures take the place of the oxygen in the air, there is a danger of asphyxia. An atmosphere containing less than 17% oxygen is dangerous.

hydrogen and hydrogen-based combustible gaseous mixtures
These are very light gases. In the case of leaks, they collect under the ceiling.
Provide for ventilation at ceiling level.

These are also inflammable gases. The flame of hydrogen is almost invisible. There is therefore a risk of burns.

Air/hydrogen and oxygen/hydrogen mixtures are explosive in the following proportions:
- 4 to 74.5 % of hydrogen in air.
- 4 to 94 % of hydrogen in oxygen.

Store the bottles in the open or in a well-ventilated place.
Avoid any leakage by limiting the number of connections or couplings to a minimum.

4. GENERAL CHARACTERISTICS

The single phase power sources THERMAL ARC 170 GMS and 220 GMS have been designed as integrated and portable units using the latest techniques in power electronics, based on an IGBT controlled **inverter process**, which enables the following :

- a considerable reduction of weight and volume
- the dynamic control of the welding current
- a high power in a small space at a very low power consumption

With their innovative design, these machines are both **robust** (plastic front and back panel, new internal conception) and **ergonomic**.

The THERMAL ARC 170 GMS and 220 GMS units are multiprocess DC inverters wich allow :

- **MMA welding** (stick welding) : with coated electrodes until 4 mm (170 GMS) or 5 mm (220 GMS)

- **TIG welding** : with infusible electrodes . Ignition made with PAE (« lift arc ») process.

2 stroke or 4 stroke mode
Post gas adjustment
Down-slope time adjustment
Gas purge

- **MIG welding** : wire feeder built in

15 kgs spools
steel wire, stainless steel wire of diameter 0.6 mm to 1.0 mm (170 GMS) or 1.2 mm (220 GMS)
direct or reverse polarity of the wire
2 stroke or 4 stroke mode
Post gas adjustment
Cold wire inch
Burn-back adjustment
Inductor linear adjustment

Spot MIG welding :
with adjustment of the spot's time

Intermittent MIG welding :
with adjustment of the spot's time and
of their frequency.

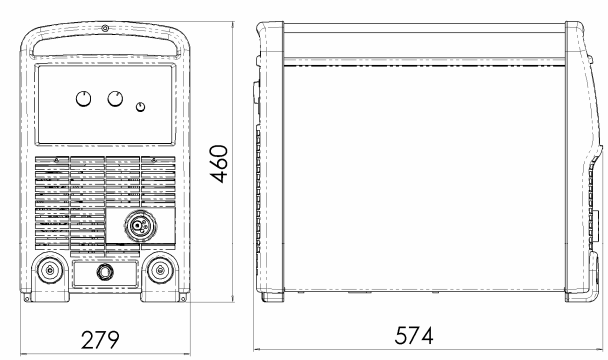
These power sources offer exceptional arc stability.

Easy to use, they can be adjusted exactly to your need :
- They have a linear electronic inductor, wich allows total variation of the arc (soft or hard) and limits the amount of spatter.
- They have adjustable burn back wich allows the adjustment of the wire's length after the torch's head at the end of the welding.

They are perfectly suited to the MIG welding with aluminium wire.

5. TECHNICAL CHARACTERISTICS

DIMENSIONS (in mm)



PRIMARY		THERMAL ARC 170 GMS			THERMAL ARC 220 GMS		
Single phased power supply	V	230					
Frequency	Hz	50 / 60					
		MMA	**TIG**	**MIG**	**MMA**	**TIG**	**MIG**
Maximum primary current	A	23	14.1	22.6	33	21	32.4
Maximum power consumption	kVA	5.3	3.2	5.2	7.5	4.8	7.5
Power factor (cos Ø)		0.98					
Primary protection	A	16			20		
SECONDARY							
		MMA	**TIG**	**MIG**	**MMA**	**TIG**	**MIG**
Off load voltage	V	50-60	15	15	80	15	15
Welding current range	A	3 à 150	3 à 150	-	3 à 200	3 à 200	-
Welding current at 40℃							
Welding current at 15 %	A	-	-	170	-	-	220
Welding current at 20 %	A	150	150	150	-	-	-
Welding current at 35 %	A	-	-	-	200	200	200
Welding current at 60 %	A	105	110	110	160	170	170
Welding current at 100 %	A	95	100	100	140	150	150
Welding current at 25℃							
Welding current at 60 %	A	130			180		
Welding current at 100 %	A	120			160		
Protection degree		IP 23					
Insulation class		H					
Standards		EN 60974-1 / EN 50199					
Weight	kg	19					
Dimensions L x W x H	mm	570 x 279 x 460					

6. CONNECTION TO THE MAIN SUPPLY

The power source must be connected to a single-phase 230V - 50 Hz/60 Hz mains + ground.

Main supply must be protected by fuses or circuit-breaker according to the value $I1_{eff}$ written on the specifications of the power source.

It is strongly suggested to use a differential protection for the operator's safety

7. CONNECTION TO THE GROUND

For the operator's protection, the power source must be correctly grounded (according to the International Protections Norms).

It is absolutely necessary to provide a good ground connection installation with the green/yellow lead of the power cable. This will avoid discharges caused by accidental contact with grounded pieces.

If no earth connection has been set, a high risk of electric shock through the chassis of the unit remains possible.

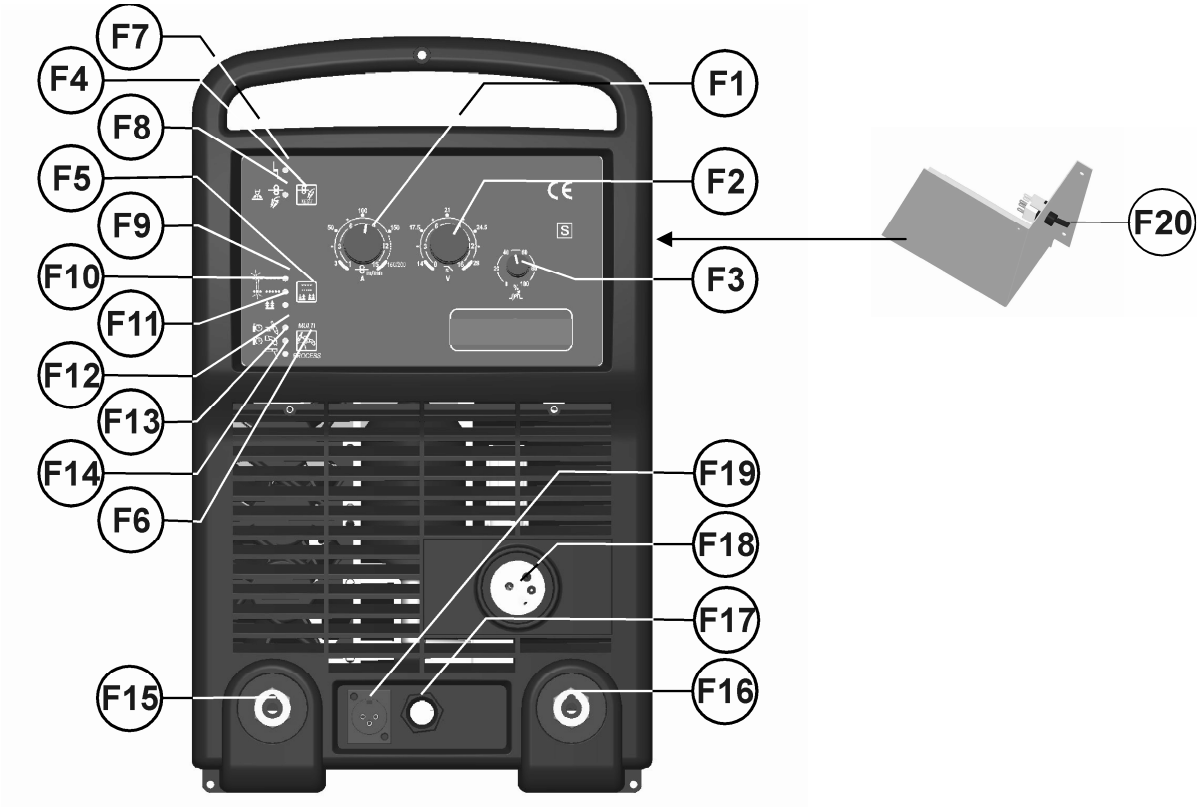
8. PRELIMINARY PRECAUTIONS

For the good operation of your welding power source, make sure that the air flow produced by the fan inside the unit is not obstructed.

Also try to operate in a non-dusty area.

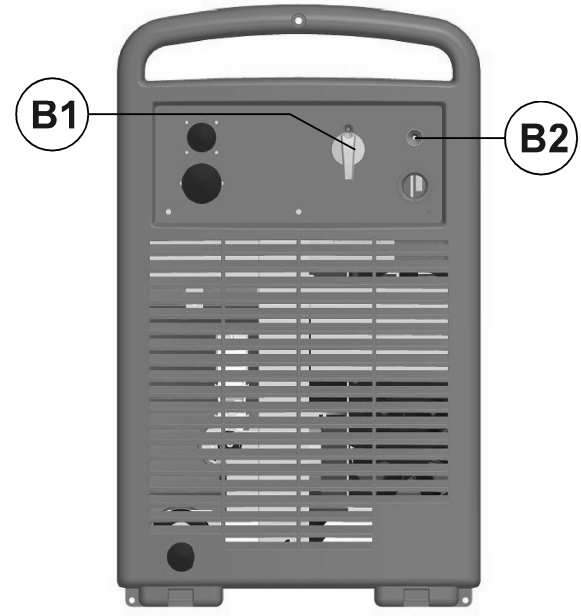
Avoid all impacts, exposure to damp areas or excessive temperatures.

9. DESCRIPTION OF THE FRONT PANEL



ITEM	DESCRIPTION	ITEM	DESCRIPTION
F1	Knob for intensity, wire speed and parameters	**F12**	« TIG welding » indicator or TIG post gaz in adjustment indicator
F2	Knob for voltage and down-slope time	**F13**	« MIG welding » indicator or MIG post gaz in adjustment indicator
F3	Knob for linear inductor	**F14**	« MMA welding » indicator
F4	Setting key « gaz purge or cold wire inch » Burn-back adjustment	**F15**	Power terminal **+**
F5	Setting key for selecting 2 stroke or 4 stroke welding mode, intermittent MIG welding or spot MIG welding	**F16**	Power terminal **-**
F6	Setting key for selecting welding mode	**F17**	Torch's polarity connection
F7	Overheat indicator	**F18**	Torch's EURO connector
F8	« gaz purge or cold wire inch » indicator Burn-back in adjustment indicator	**F19**	Female socket for connecting the spool gun
F9	« intermittent MIG welding » indicator or « time between two spots » in adjustment indicator	**F20**	Switch « wire feeder built in » or « spool gun »
F10	« spot MIG welding » indicator or « spot's time » in adjustment indicator		
F11	Indicator « 4 stroke welding »		

10. DESCRIPTION OF THE BACK PANEL



ITEM	DESCRIPTION
B1	Switch ON/OFF
B2	Gas input

11. MMA (STICK) WELDING

Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as para 6 and 7).
Connect the ground cable and the electrode-holder to the appropriate power connections + **F15** and – **F16** according to the electrode polarity being used (refer to the electrodes manufacturer's datasheets).
The "torch's polarity connection" **F17** is not connected.
Start up the power source with the main switch ON/OFF **B1**.

Select MMA(stick) welding mode with the setting key **F6**, the indicator **F14** illuminates.

Adjust welding current with potentiometer **F1**.
Note: For THERMAL ARC 170 GMS unit, the welding current can be adjusted until 150A maximum. The graduation between 150A to 200A is not available.

Place the electrode on the piece you have to weld in order to strike the arc.

Arc force control
Arc force control is not adjustable, but it is optimised for welding with a large range of rutile and basic electrodes

12. TIG WELDING

Connect the unit

Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as para 6 and 7).
Connect the ground cable to the power connection + **F15** and the torch's polarity connection **F17** to the – **F16**.
Connect the torch in the EURO connector **F18** and do it up to the end of the threads.

Connect the gas supply

Open the valve of the bottle for a moment to remove any impurities.
Fit the flow-control valve (flow from 5 to 8 l/mn) to the output of the bottle and its pipe.
Connect the gas pipe at the rear of the machine, at the gas input **B2**.
Open the bottle.

Set TIG parameters

Start up the power source with the main switch ON/OFF **B1**.

- TIG welding mode

Select TIG welding mode with the setting key **F6**, the indicator **F12** illuminates.
Adjust welding current with potentiometer **F1**.

- 2 stroke or 4 stroke mode

If the indicator **F11** is OFF, 2 stroke mode is selected.
Select 4 stroke mode with the setting key **F5**, the indicator **F11** illuminates.

- Post gas

Depress the setting key **F6** for more than 3 seconds, the indicator **F12** flickers, and adjust the post gas with the potentiometer **F1**.
The post gas can be adjusted from 0 to 10s.
Release the key when setting is finished.

- Down-slope time

Adjust the down-slope time from 0 to 16s with the potentiometer **F2**.

- Welding current

Adjust the welding current with the potentiometer **F1**.
Note: For THERMAL ARC 170 GMS unit, the welding current can be adjusted until 150A maximum. The graduation between 150A to 200A is not available.

Welding

Put the tungsten electrode in direct contact with the workpiece. Push on the trigger.
Raise the torch slowly. The arc strikes according to the cycle described hereunder.
NOTE : When the tungsten electrode comes into contact with the workpiece, the current is maintained in a low value till the electrode lifts up in order to avoid tungstens penetration.

Purge the gas

If necessary, connect the TIG torch on the EURO connector **F18** and do it up to the end of the threads and start up the power source with the main switch ON/OFF **B1**.
Depress the setting key **F4**, the indicator **F8** illuminates.
This operation evacuates the air wich is still in the pipes inside the machine.
Depress the key **F4** to stop this operation.

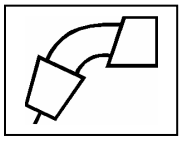
13. MIG WELDING

13.1. PREPARATION FOR WELDING WITH THE MIG TORCH

Connect the unit
Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as para 6 and 7).
Connect the ground cable and the torch's polarity connection **F17** to the power connection + **F15** and – **F16**, regarding to the type of wire used.

Connect the gas supply
Open the valve of the bottle for a moment to remove any impurities.
Fit the flow-control valve (flow from 5 to 8 l/mn) to the output of the bottle and its pipe.
Connect the gas pipe at the rear of the machine, at the gas input **B2**.
Open the bottle.

Choose the wire feeding unit
Open the door. Put the switch **F20** on position "MIG torch".



Fitting the feed rolls
Place the fitted feed rolls in the wire feeding unit according to the instructions given chapter 17.
It is essential that the spool be fitted with the appropriate feed rolls, so as to provide the best welding and spooling conditions.

Setting up of the wire in the spool
(please see the spare parts lists of the machine in chapter 17)
You can use wire's type : steel, stainless steel, aluminium wire of diameters from 0.6 mm to 1.0 mm.

Undo the retaining screw of the spool (screw on **Item. 26**) .
Engage the spool on its support, (**Item. 26**), taking care to position the rod of the spool brake correctly.
The spool must be mounted so that the wire is spooled from below.
The firmness of the spool brake can be adjusted using the central screw located behind the screw (**Item. 26**). This system allows the motion of the spool to be stopped at the end of spooling, preventing it from rotating further. This is vital when one is spooling at high speeds. **Nevertheless, the spool should not be braked excessively, in order not to overload the motor.**

Re-fit the retaining screw (screw on **Item. 26**).

Engage the wire in the wire feeding unit according to the instruction given chapter 17 and let it go out the EURO connector **F18.**

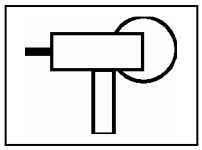
Inch the wire
If necessary, connect the MIG torch on the EURO connector **F18** and do it up to the end of the threads and start up the power source with the main switch ON/OFF **B1**.
Depress the setting key **F4**, the indicator **F8** illuminates.
This operation inches the wire.
Depress the key **F4** to stop this operation.

13.2. PREPARATION FOR WELDING WITH THE SPOOL GUN

Connect the unit
Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as para 6 and 7).
Connect the ground cable and the torch's polarity connection **F17** to the power connection + **F15** and – **F16**, regarding to the type of wire used.

Connect the gas supply
Open the valve of the bottle for a moment to remove any impurities.
Fit the flow-control valve (flow from 5 to 8 l/mn) to the output of the bottle and its pipe.
Connect the gas pipe at the rear of the machine, at the gas input **B2**.
Open the bottle.

Choose the wire feeding unit
Open the door. Put the switch **F20** on position "spool gun".



Connect the spool gun
Connect the spool gun on the female socket **F19**.

13.3. ADJUSTMENT OF THE PARAMETERS

- MIG welding mode
Select MIG welding mode with the setting key **F6**, the indicator **F13** illuminates.

- 2 stroke or 4 stroke mode
If the indicator **F11** is OFF, 2 stroke mode is selected.
Select 4 stroke mode with the setting key **F5**, the indicator **F11** illuminates.

- Post gas
Depress the setting key **F6** for more than 3 seconds, the indicator **F13** flickers, and adjust the post gas with the potentiometer **F1**.
The post gas can be adjusted from 0 to 8s.
Release the key when setting is finished.

- Wire speed
Adjust the wire speed from 1 to 15 m/min with potentiometer **F1**.

- Arc voltage
Adjust the arc voltage from 14V to 28V with the potentiometer **F2**.

- Inductance
Adjust the inductance value with the potentiometer **F4** in order to adapt it to the arc you need and to limit the spatter.

- Burn-back
This parameter adjusts the wire length after the torch's head at the end of the welding.
Depress the setting key **F4** for more than 3 seconds, the indicator **F8** flickers, and adjust the burn back with the potentiometer **F1**.
The burn back can be adjusted from 0 to 400 ms.
Release the key when setting is finished.

14. SPOT MIG WELDING

Read the instructions for the preparation of the generator given in para **13.1**

Adjustment of the parameters

- Spot MIG welding mode

Select MIG welding mode with the setting key **F6**, the indicator **F13** illuminates.
Select “MIG spot welding” mode with the setting key **F5**, the indicator **F10** illuminates.

- Spot time

Depress the setting key **F5** for more than 3 seconds, the indicator **F10** flickers, and adjust the spot time with the potentiometer **F1**.
The spot time can be adjusted from 0 to 2.5s.
Release the key when setting is finished.

- Others parameters

Adjust the others parameters as described in para **13.2**, except 2 stroke/4 stroke mode (not available in this type of welding mode).

Welding

Depress the torch’s trigger in order to start welding. The arc dies out after the spot time.
Relax and depress the trigger to start a new spot time.

15. INTERMITTENT MIG WELDING

Read the instructions for the preparation of the generator given in para **13.1**

Adjustment of the parameters

- Spot time

Select “MIG spot welding” mode with the setting key **F5**, the indicator **F10** illuminates.
Depress the setting key **F5** for more than 3 seconds, the indicator **F10** flickers, and adjust the spot time with the potentiometer **F1**.
The spot time can be adjusted from 0 to 2.5s.
Release the key when setting is finished.

- Intermittent MIG welding mode

Select MIG welding mode with the setting key **F6**, the indicator **F13** illuminates.
Select “Intermittent MIG welding” mode with the setting key **F5**, the indicator **F9** illuminates.

- Time between 2 spots

Depress the setting key **F5** for more than 3 seconds, the indicator **F9** flickers, and adjust the spot time with the potentiometer **F1**.
The spot time can be adjusted from 0 to 2.5s.
Release the key when setting is finished.

- Others parameters

Adjust the others parameters as described in para **13.2**, except 2 stroke/4 stroke mode (not avalaible in this type of welding mode).

Welding

CAUTION: Before welding, check that the “intermittent MIG welding” is selected (indicator **F9** ON)
Depress the torch’s trigger in order to start welding. When holding on the trigger, you will do the welding cycles defined with parameters adjusted above. Release the trigger to stop the cycle.

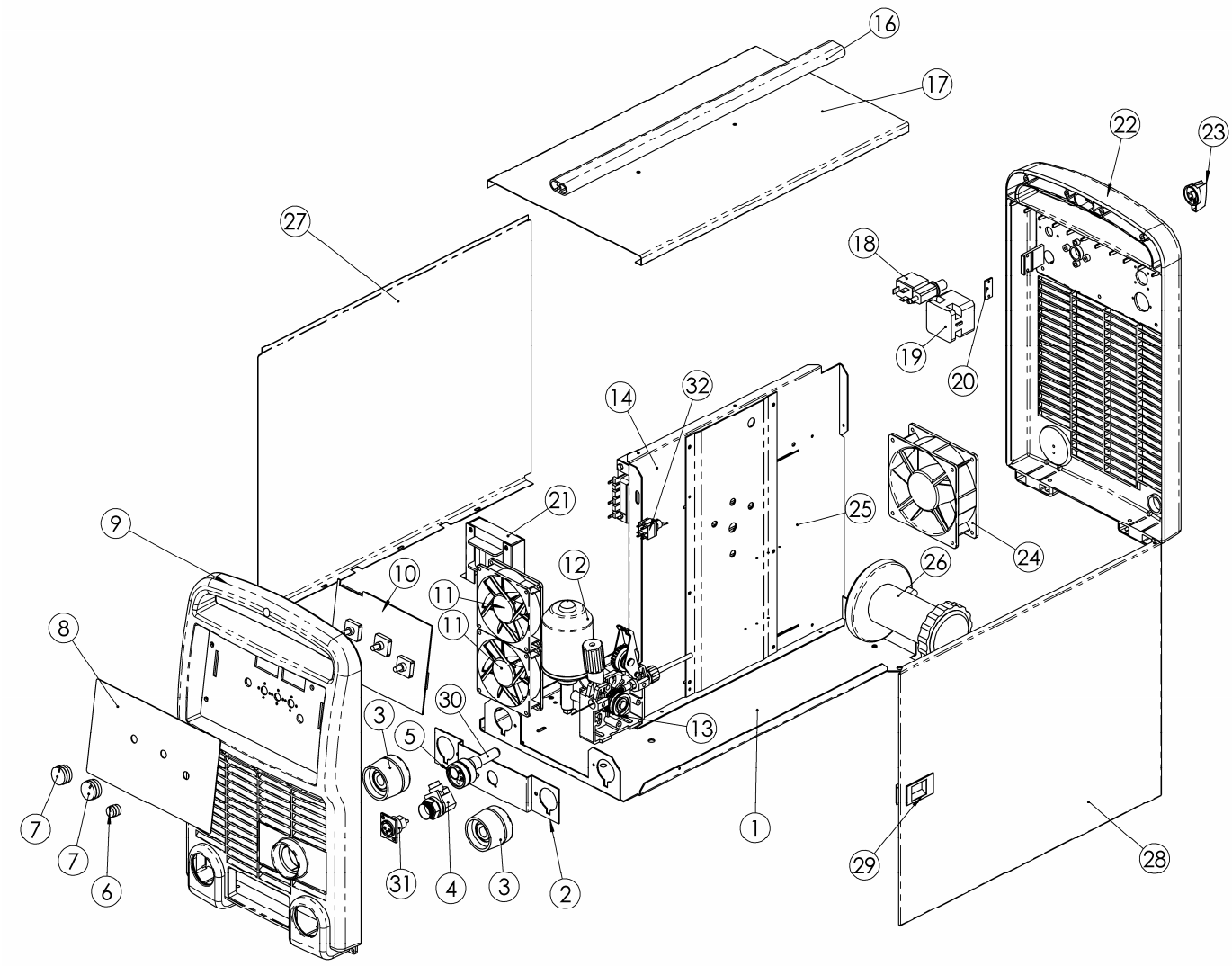
16. MAINTENANCE

CAUTION : BEFORE OPENING the unit, disconnect the power source from the mains. Voltages are high and dangerous inside the machine.

In spite of their robustness, THERMAL ARC power sources require some regular maintenance.
Once every 6 months (more often in dusty surroundings) :

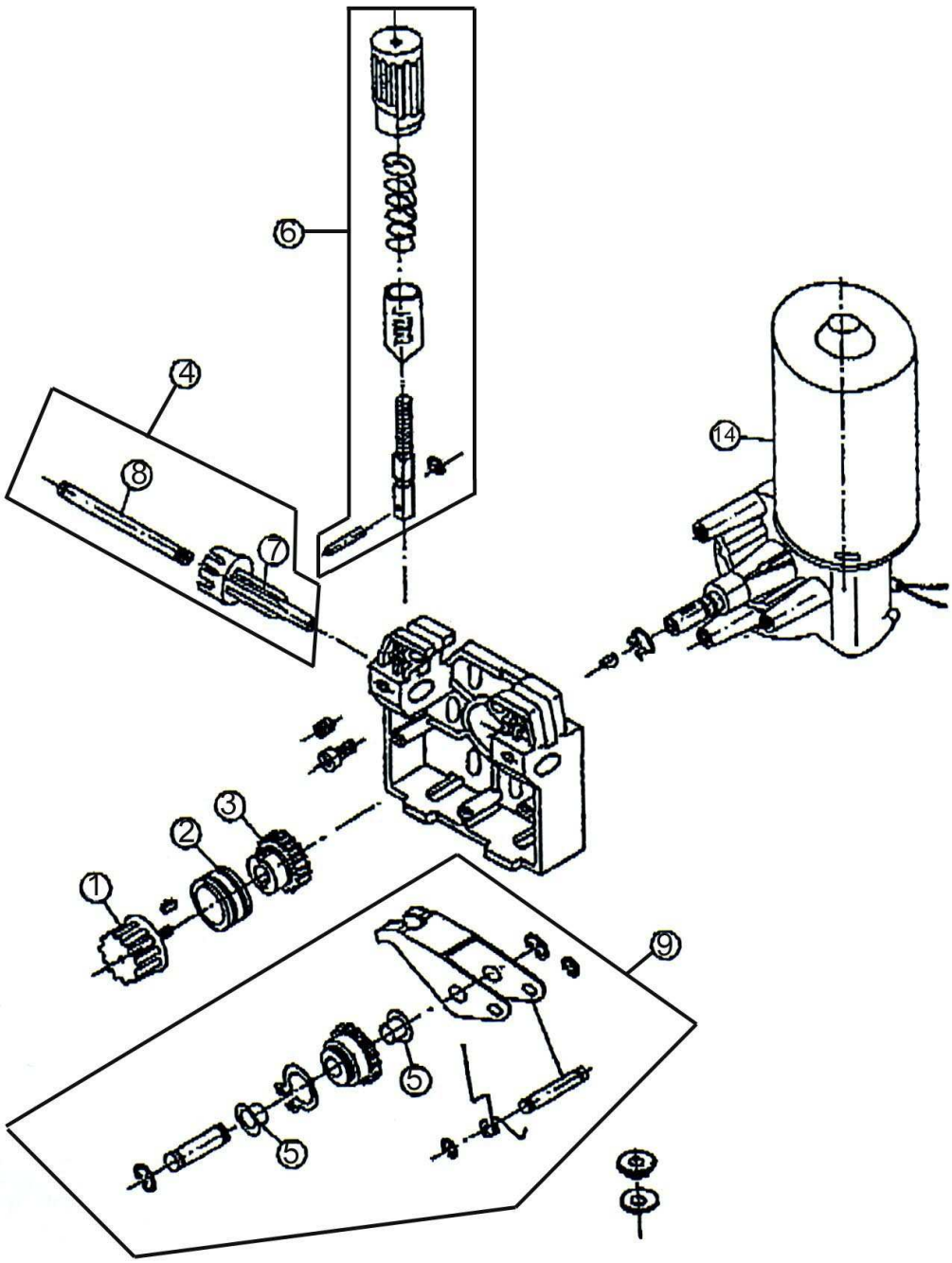
- the machine must be blown through with dry, oilfree compressed air
- check all connections for electrical continuity.
- Check all cable connections, including ribbon cables.

17. SPARE PARTS



ITEM	REFERENCE	DESCRIPTION
1	I06002	Chassis
2	I06017	Bottom of the front face
3	060153	Power terminal 35/50 mm²
4	B06050	Cable anchorage
5	C60438	EURO connector
6	B01060	Knob diam. 14
7	B01062	Knob diam. 23
8	B00012-TH	Front fascia
9	I06013	Black front frame
10	L93281	Front face PCB CI 328 170GMS
	L93282	Front face PCB CI 328 220GMS
11	V01000	Fan 92*92 24Vdc
12	U21030-1	Motor without wire feeding unit
13	U10000	Wire feeding unit without motor
	U21030	Complete wire feeder unit
14	T02002	Transformer 100VA 48V
16	J15021-4-P9005	Handle
17	I06034-P3005	Cover
18	F04001	Gas valve 48Vdc
	F18008	Adaptator F12/100-M3/8 BSP
19	G02010	Commutator ON/OFF
20	I06090	Cable anchorage
21	T18115	Inductor
22	I06021-MIG	Black back frame
23	G10005	Commutator handle
24	V01003	Fan 120*120 220 Vac THERMAL ARC 170GMS
	V01008	Fan 120*120 12 Vdc THERMAL ARC 220GMS
25	E11209	Main PCB THERMAL ARC 170GMS
	E11214	Main PCB THERMAL ARC 220GMS
26	U20030	Spool support with screw
27	I06035-P3005	Panel
28	I06036-P3005	Door
29	A20002	Lock for door
30	C60427	Wire inlet for EURO connector
31	C10202	Female socket 3 pins
32	B05012	Switch
	060154	Male plug 35/50 mm²
	C12201	Male plug 3 pins

UNITE DE DEVIDAGE U21030
COMPLETE WIRE FEEDING UNIT U21030



ITEM	REFERENCE	DESCRIPTION
1	**U45854**	Fixing cap
2	**U45806**	Feed roll diam 0.6 / 0.8 groove « V »
	U45807	Feed roll diam 0.8 / 1.0 groove « V »
	U45810	Feed roll diam 1.0 / 1.2 groove « V »
	U45821	Feed roll diam 0.6 / 0.8 groove « U »
	U45823	Feed roll diam 0.8 / 1.0 groove « U »
	U45820	Feed roll diam 1.0 / 1.2 groove « U »
3	**U30002**	Gear wheel
4	**U45419**	Complete inlet wire guide
5	**U45853**	Stainless steel bearing
6	**U30000**	Fixing shaft
7	**U45418**	Inlet guide
8	**U45417**	Wire guide tube
9	**U30001**	Complete pressure arm
14	**U21030-1**	Motor without wire feeding unit
	U10000	Wire feeding unit without motor

The wire feeding unit consists of one pressure feed roll at the top, usable for all the wires, and one grooved feed roll (**Item. 2**) at the lower, which have to be adapted to the nature of the wire and to its diameter.
It is essential that the spool be fitted with the appropriate feed rolls, so as to provide the best welding and spooling conditions.

Each grooved feed roll is designed to weld 2 different diameters. To change diameter, the feed roll is just turned round. The feed roll mounted as standard on delivery are designed to weld steel/stainless steel wire (triangular groove in « V ») 0.6 or 0.8 mm in diameter (by turning the feed roll). Another feed roll is supplied for steel wire of 0.8 or 1.0 mm in diameter.

Spooling of aluminium wires :
For aluminium wire, semicircular grooved (in « U ») feed rolls are available as options in diameters 0.6/0.8 mm and 0.8/1.0 mm.
These type of feed rolls are recommended for spooling of aluminium wires, since they prevent deformation or crushing of the wire.

Replacing the feed rolls
Release the pressure of the upper feed roll, using knob of the fixing shaft (**Item. 6**).
Undo the fixing cap (**Item. 1**) of the lower feed roll.

Remove the lower feed roll (**Item. 2**), and turn it or fit a different feed roll in its place.
Engage the feed roll well down onto the gear wheel (**Item. 3**).
Refit the fixing cap (**Item. 1**).
Refit the pressure of the upper feed roll, using knob of the fixing shaft (**Item. 6**).

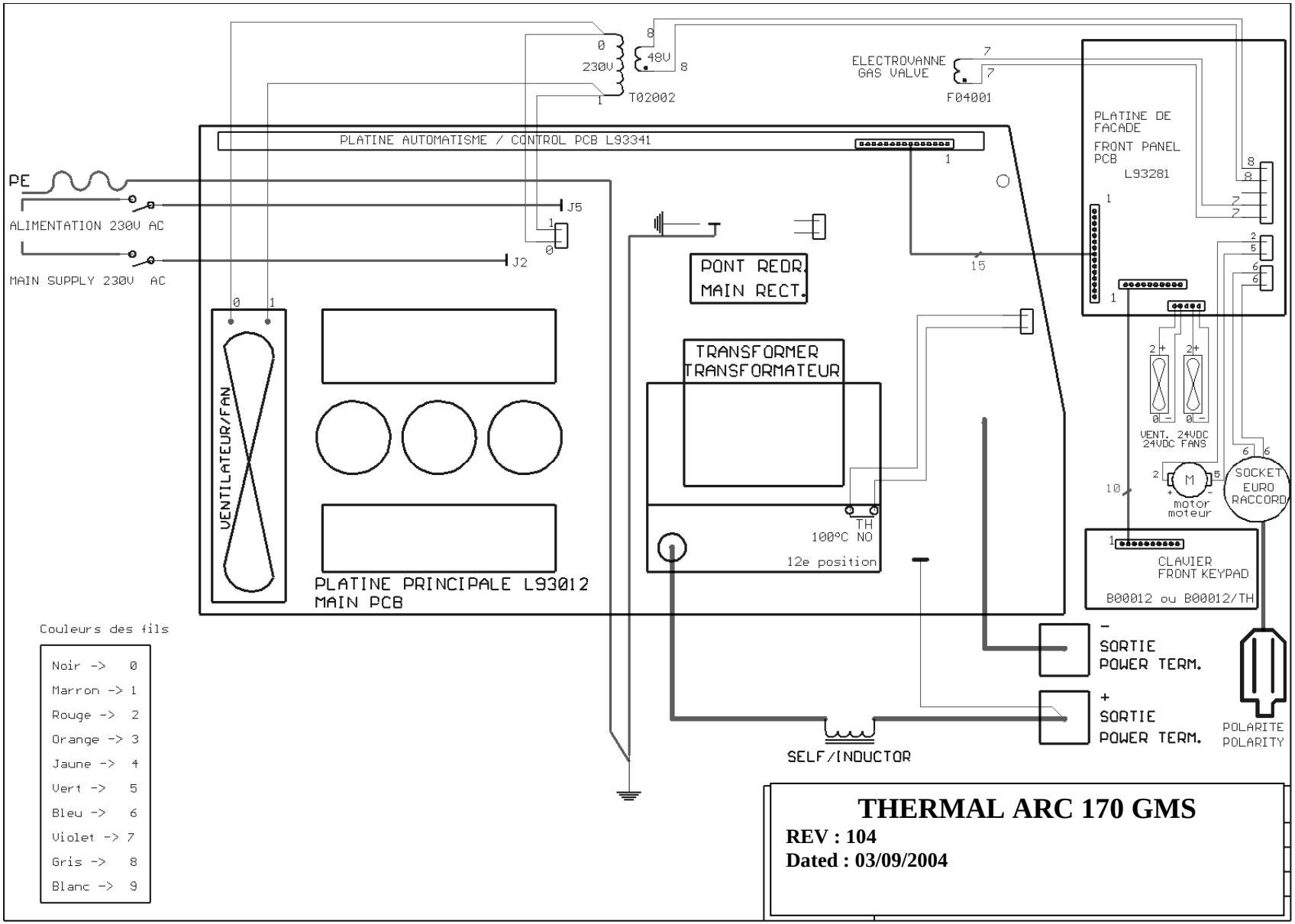
Place the wire in the wire feeding unit
Release the pressure of the upper feed roll, using knob of the fixing shaft (**Item. 6**).
Engage the wire in the inlet guide (**Item. 4**), then in the groove of the feed roll, finally in the wire inlet of the EURO connector **F16** until the wire comes out of the connector.

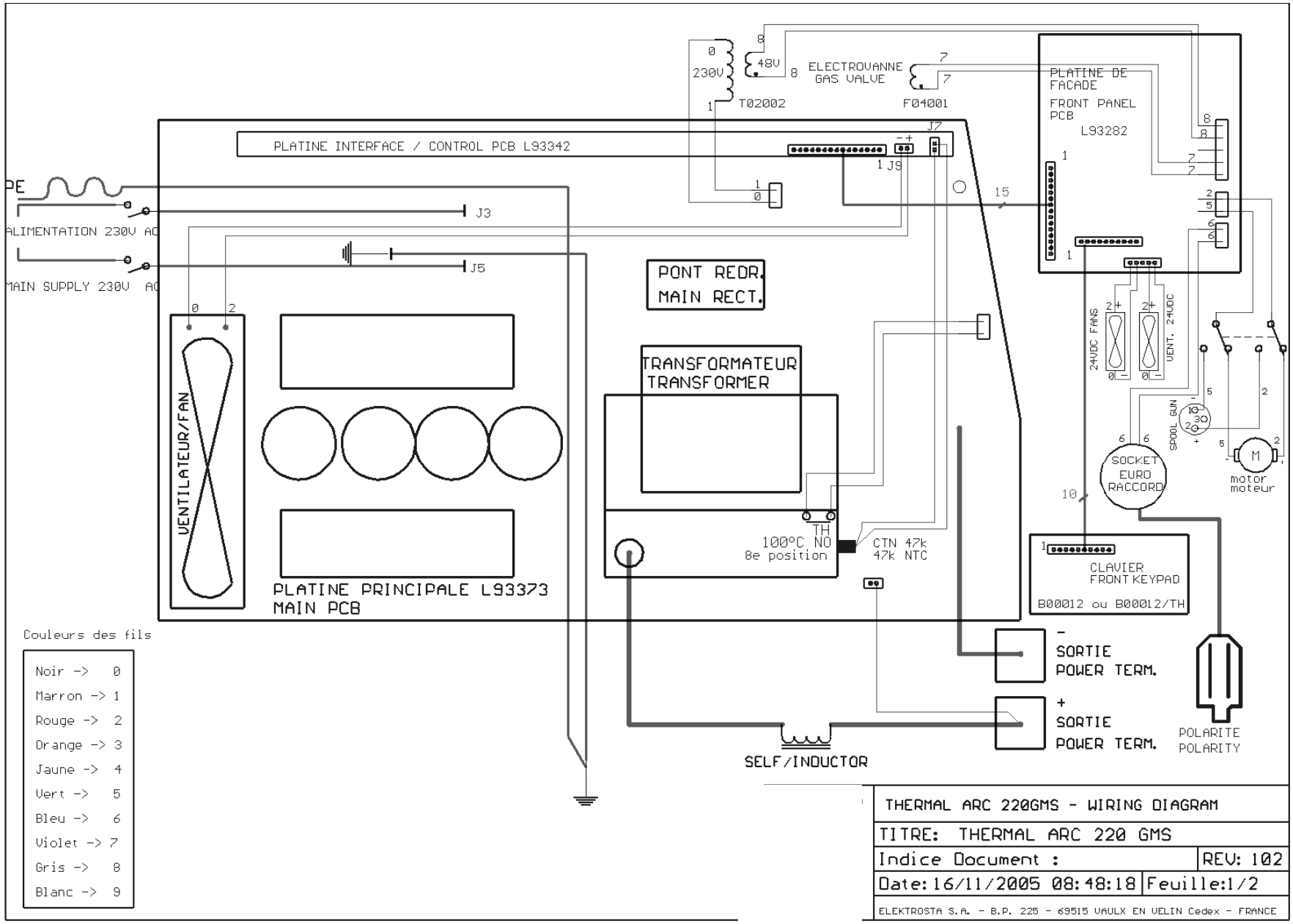
18. TROUBLE SHOOTING

BEWARE : BEFORE ANY INTERNAL INTERVENTION, disconnect the power source from the power supply. Internal voltages are high and dangerous

POSSIBLE CAUSES	CHECKING / REMEDY
ALL INDICATORS OFF = NO SUPPLY	
ON/OFF main switch is OFF	Put the switch ON
Power supply cable is cut	Check cable and connections
No main supply	Check circuit breaker and fuses
Defective ON/OFF main switch	Replace the switch
INDICATOR F7 ON = WARMING UP	
Duty cycle over rated (particulary if ambient t°is > 25°C)	Let the machine cool, it will automatically start again
Insufficient cooling air	Clean the air inlets
Very dusty machine	Open the machine and blow it through
Fan doesn't start	Replace the fan
IMPROPER WELDING	
Wrong electrode or wire polarity	Use the right polarity according to the indications of electrode's manufacturer Check the torch's connection
OTHER TROUBLES	
No ignition	Check the TIG torch's trigger Check that the torch's connection output is connected to the power terminal -
No wire feeding	Check the MIG torch's trigger
No gas present at machine inlet	Check the gas supply
No gas supply at machine outlet	Check the gas valve

19. WIRING DIAGRAMS




PE
ALIMENTATION 230V AC
MAIN SUPPLY 230V AC
PLATINE INTERFACE / CONTROL PCB L93342
J3
J5
J7
J9
0
230V
1
8
48V
8
T02002
ELECTROVANNE
GAS VALVE
7
7
F04001
PLATINE DE
FACADE
FRONT PANEL
PCB
L93282
15
PONT REDR.
MAIN RECT.
TRANSFORMATEUR
TRANSFORMER
VENTILATEUR/FAN
PLATINE PRINCIPALE L93373
MAIN PCB
TH
100°C NO
8e position
CTN 47k
47k NTC
24VDC FANS
VENT. 24VDC
SPOOL GUN
SOCKET
EURO
RACCORD
motor
moteur
10
CLAVIER
FRONT KEYPAD
B00012 ou B00012/TH
SORTIE
POWER TERM.
SORTIE
POWER TERM.
POLARITE
POLARITY
SELF/INDUCTOR
Couleurs des fils
Noir -> 0
Marron -> 1
Rouge -> 2
Orange -> 3
Jaune -> 4
Vert -> 5
Bleu -> 6
Violet -> 7
Gris -> 8
Blanc -> 9
THERMAL ARC 220GMS - WIRING DIAGRAM
TITRE: THERMAL ARC 220 GMS
Indice Document :
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20. APPENDICE : ADJUSTABLE VALUES FOR WELDING PARAMETERS

	Units	THERMAL ARC 170GMS	THERMAL ARC 220GMS
stick welding			
Welding current range	**A**	3 to 150	3 to 200
TIG welding			
Welding current range	**A**	3 to 150	3 to 200
Post gas	**s**	0 to 10	0 to 10
Down slope	**s**	0 to 16	0 to 16
MIG welding			
Arc voltage	**V**	14 to 28	14 to 28
Wire speed	**m/min**	1 to 15	1 to 15
Post gas	**s**	0 to 8	0 to 8
Inductor	**%**	0 to 100	0 to 100
Burn back	**ms**	0 to 400	0 to 400
Spot's length	**s**	0 to 2.5	0 to 2.5
Time between 2 spots	**s**	0 to 2.5	0 to 2.5

THERMAL ARC®	***Thermadyne Industries, Ltd.*** ***U.K*** *Chorley, England* **Tel : (44) 01257 261 755** **Fax : (44) 01257 224 802**
	Thermadyne Industries, Ltd. ***Netherlands*** *Hoofddorp, Holland* **Tel : (31) 23 561 4182** **Fax : (31) 23 565 5074**
	Thermadyne Industries, Ltd. ***Italia*** *Milan, Italy* **Tel : (39) 039 204 991** **Fax : (39) 039 204 9922**
	PTA Plasmatechnik. ***Germany*** *Westerburg, Germany* **Tel : (49) 2663 915666** **Fax : (49) 2663 915667**

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